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A New Species of *Andrena* from Texas, with Descriptive and Synonymical Notes on *Andrena belfragei* Cresson (Hymenoptera: Apoidea)

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The new species described herein is based on a series in the United States National Museum which had been given a manuscript name by Viereck. The unusual color pattern of the female in this species, approached by only one other species in the United States, makes it easily recognizable in our fauna.

***Andrena dolomellea* new species**

Female. Integument mostly ferruginous, with details of coloration as follows: clypeus, adjacent areas of face, base of mandibles, scape, pedicel, first flagellar segment, and lower one-half of cheeks ferruginous, rest of head black; mesoscutellum, metanotum, lower one-third of pleura, and dorsal surface of propodeum with strong ferruginous markings and tints, rest of thorax black, legs entirely ferruginous; anterior terga ferruginous, posterior terga becoming blackish; all pubescence rich fulvous. Clypeus closely, irregularly, and rather weakly punctate, the lower half slightly shining, with a poorly developed median ridge; facial fovea wide above, occupying more than three-fourths distance between eye and lateral ocellus, terminating at about level of clypeal margin; process of labrum large, broadly truncate, truncature slightly concave; mandibles ordinary, with ventral membranous flange short; antennae with segment 3

about equal to $4 + 5$. Mesoscutum with moderately short pubescence, not nearly dense enough to obscure integument, integument reticulate, with dense, large, but rather weak punctures; mesoscutellum reticulate, with sparse punctures; metanotum strongly protuberant; enclosure of propodeum reticulate, with a few weak, irregular wrinkles above; propodeal corbiculum with dorsal fringe well developed, no anterior fringe, but hairs of anterior portion branched, interior with dorsal one-half hairy; tibial scopa copious, hairs of outer face simple, trochanteral floccus imperfect, middle basitarsus not conspicuously widened at middle; wings uniformly and strongly darkened, stigma black, moderately slender, first recurrent nervure ending slightly before middle of second submarginal cell. Terga strongly punctate, first tergum with few punctures on elevated portion, closely punctate on depressed posterior margin, remaining terga closely and evenly punctate, with punctures of fourth tergum becoming indistinct; caudal fimbria bright fulvous; pygidium broadly rounded at apex.

Length 13 mm., forewing 11 mm.

Holotype female: Willis, TEXAS, April, 1903 (Bridwell).

Male. Black, except legs and most of terga ferruginous; pubescence fulvous. Head with pubescence of face rather short; cheeks somewhat wider than eyes, broadly rounded; mandibles moderately long, decussate; antennae with segment 3 about equal to 4. Wings lighter than in female, but still well darkened, especially apically. Tergal sculpture about as in female. Genitalia with tips of parameres long, slender, parapenial lobes moderately produced, broad; sagitta with sides not excavated, widened for about half its length; tip of eighth sternite moderately and evenly expanded, apical margin slightly concave.

Length 11 mm., forewing 9 mm.

Allotype male: same data as holotype. *Paratypes*: 2 females, same data as holotype, one bearing an additional label "*Cratagrus*"; one female, Fedor, Texas (Birkman): 1 female, Mound, Louisiana, 2 April 1907 (F. C. Bishopp) and one male, same locality, 7 March 1907, on turnip (Bishopp).

In spite of its bizarre appearance, produced by the ferruginous markings of the face, thorax and abdomen, this species is structurally a normal member of the *vicina-hilaris* series, as shown by the imperfect trochanteral floccus, simple hairs of the scopa, and slender parameres of the male genitalia. It is most like *hilaris* Smith, differing in the much more closely punctured terga and the larger size. *A. mellea* Cresson, the only other North American *Andrena* known to me to have ferruginous markings on the thorax, has the posterior spur of the hind tibia strongly bent and flattened basally (linear in *dolomellea*), and has the pleura coarsely sculptured, therefore belonging to the group of *A. argemonis* Ckll. and *A. prunorum* Cockerell, a group not at all related to the present species.

A. dolomellea is another example of ferruginous members of an otherwise black series of bees occurring in the southern United States. The subgenus *Pterandrena*, elsewhere a group of black bees, has at least one reddened species in Southern Kansas and Texas.

***Andrena belfragei* Cresson**

Andrena belfragei Cresson, 1872, Trans. Amer. Ent. Soc. 4: 256, female.

Andrena brunniventris Cresson, 1872, Trans. Amer. Ent. Soc. 4: 258, male. (New synonym.)

Andrena texana Howard (not Cresson), 1901, Insect Book, plate 4, fig. 7.

In order to eliminate the possibility that *A. dolomellea* might be the same as *A. brunniventris*, described very briefly by Cresson from a single male, Dr. Karl V. Krombein compared the allotype of *dolomellea* with Cresson's type for me, and found them to be distinct. Mr. P. H. Timberlake further investigated the matter, and found in the collection of the U. S. National Museum a male specimen from Texas ("Collection Belfrage") which had been determined by Ashmead as *A. belfragei* Cresson; Mr. Timberlake compared it with the type of *brunniventris* and thought them to be the same. This male specimen is the one figured by Howard in the Insect Book, plate 4, figure 7, as *A. texana*. Comparison of the specimen with a female *belfragei*

loaned by the U. S. National Museum (from "Tex., Collection Belfrage") leaves little doubt that it is actually the male of this species. *A. belfragei* belongs to a group of species related to *Andrena carlini* Cockerell, characterized by the perfect trochanteral floccus of the female and the expanded tips of the parameres in the male genitalia; otherwise, the group closely resembles the *vicina* series. The species is characterized in this group by the densely and strongly punctured abdominal terga; it agrees with *A. viburnella* Graenicher in this respect, and further study may show *viburnella* to be only a darker (black instead of slightly reddened) northern race of *belfragei*.

Monarch Butterfly Migrating in Botetourt County, Virginia

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At noon on September 28, 1941, while driving north on Route 11 about 5 miles from Roanoke, Virginia, we noted monarch butterflies (*Danaus plexippus* L.) flying across the highway to the south. It was a clear day with a temperature of 90° F., and a southerly breeze was blowing. When we stopped we saw 25 butterflies in several minutes and in one 60-second period noted 6 crossing the roadway. Nine more crossed the highway in less than a minute. These insects flew at an altitude of 2 to 20 feet, crossing the highway at about 7 per minute at this point. This was at the rate of 420 per hour. A heavy migration was definitely in progress.

As we continued our journey we saw numbers of dead monarchs on the highway. At Troutville, Virginia, we counted 9 monarchs lying on the highway within a quarter of a mile.

Proceeding northward to Natural Bridge and Lexington, Virginia, we saw other monarchs in flight and on the highway. We saw several on Blue Ridge Mountain and on Mt. Long at an elevation of 2,000 feet or more.

Some Observations on *Megarhyssa* (Hymenoptera, Ichneumonidae)

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On June 25, 1947, Professor J. T. Darlington took me about two miles from the Emory University campus to a beech tree on which he and Richard Smith had found two *Megarhyssa macrurus* (Linn.) and one *M. atrata* (Fabr.) ovipositing on May 20th. Mr. Smith returned to this tree on May 30th and found four *M. macrurus* and one *M. atrata* ovipositing.

This tree was heavily infested with *Megarhyssa* and *Tremex columba* (Linn.). I counted 217 emergence holes on the exposed, decayed portion, which was about three feet high, thirty inches wide at the ground and twelve inches wide at the top.

On July 27th I observed a specimen emerge with the ovipositor separated into three pieces for nearly an inch. I was under the impression that there were only two sheaths and an ovipositor, not knowing that the ovipositor itself was made up of three valves. After this discovery, I worked about twenty hours trying to separate the ovipositors of nine specimens. I succeeded in getting three specimens separated entirely, and two more almost entirely separated when one of the valves broke off.

On August 4th I began marking the wings of twelve *Megarhyssa atrata* females with white duco paint. All of the marked specimens returned to the tree and oviposited at least twice, number 5 ovipositing twelve times, and number 8 nine times. Number 5 oviposited three times within three hours.

Two large decayed roots about six inches apart, extending out from the base of the tree, gave a good chance to get many close-up views of the position and operation of the membrane within the sixth and seventh tergite in relation to the sheaths and ovipositor while the insects were inserting and withdrawing the ovipositor. I was able to get my eyes within six inches of the extended membrane, since *Megarhyssa* practically always oviposited with the head downward. The looped ovipositor extends the membrane, with the two sheaths within the membrane

during the drilling or inserting process; then as the drilling nears completion, the circle formed by the sheaths becomes smaller and smaller until very little can be seen, when they give a sort of flip and appear on the outside of the membrane, with one sheath on either side. Thus, when the ovipositor is being inserted, the sheaths are on the inside of the membrane, but when withdrawing, the sheaths are on the outside.

On April 30th, 1948, I painted twelve male and seven female *M. atrata*, and continued painting female *M. atrata* until May 12th, when I painted the eighteenth female. I saw all of the marked females return and oviposit except numbers 8 and 15. Number 2 oviposited only four times, while number 6 oviposited fifteen times until June 1st, when the observations were discontinued. I do not know how many times these marked specimens returned and oviposited while I was not observing the tree.

On May 1st I observed three male *M. atrata* with about one-half inch of their abdomens inserted in one hole, with several other males trying to insert the end of their abdomens. About every 10 to 12 seconds the three males would give their wings and abdomen a quivering jerk. After fifteen minutes the three males withdrew their abdomens, and in two minutes a female *M. atrata* appeared at the entrance of the hole and crawled out; thereupon one of the males mated with her at once. While this was going on there was another group of male *M. atrata* about one foot farther down on the tree, going through the same movements. The second female appeared twelve minutes later. I counted 32 males in the two groups, all being *M. atrata*, except 3 *M. macrurus*, and 2 *M. greeni* Vier. The males had become so tame that I was able to get within a foot or two of the tree without disturbing them.

On May 2nd one male *M. atrata* began trying to insert its abdomen into a small hole in the wood at 7:50 A.M., a second at 7:53, and a third at 7:58; one male withdrew his abdomen at 9:00, a second at 9:20, and a third at 9:22; the head of a female *M. atrata* appeared at 9:24, and she crawled out at 9:28 and mated as soon as she was out of the hole, and apparently mated

twice while crawling up the tree. There was great confusion amongst the 12 to 15 male *M. atrata* present.

At 9:30 A.M., May 3rd, number 3 male *M. atrata* was observed with its entire body inserted in a hole with only the white painted tip of the wing exposed. He withdrew at 9:47, and a female *M. atrata* crawled out of the hole at 9:54, when another male mated with her. I also observed three other males with only the tip of the wing extending out the hole. I presume that these males were trying to enlarge the holes so that the females could emerge.

At 12:30, May 3rd, I observed number 3 female *M. atrata* with her entire body inserted in a hole, with only about half of her wings protruding. The abdomen was withdrawn at 12:48, and the sheaths at 12:53, the abdomen was again almost entirely inserted at 1:16, and was not withdrawn at 2:00, when I had to leave the tree. At 3:00, when I returned, the abdomen was again withdrawn, and at 3:15 she inserted her abdomen for the third time. I also observed number 7 and number 10 with their entire bodies inserted with only the tips of their wings exposed; and number 6 and number 9 with their entire bodies inserted with the sheaths and the tips of their wings exposed.

During 1948 *Megarhyssa atrata* (Fabr.) was the predominant *Megarhyssa* at the beech tree. During July 1947 I collected 36 specimens of *M. atrata*, 32 of *M. macrurus* (Linn.) = *M. lunator* (Fabr.), and 18 of *M. greenei* Vier. From July 20th to August 22nd, I collected 28 specimens of *Tremex columba* Linn. and saw many more while observing the *Megarhyssa*. They would emerge and drop to the ground amongst the beech leaves, and then almost at once they were off in a flash. I observed only one *Tremex* ovipositing, and this was at 6:00 A.M.; possibly I was late in getting out to the beech tree.

Sometimes there were as many as fifteen female *Megarhyssa* on this tree at a time, with as many as nine ovipositing at one time.

I wish to thank Dr. H. K. Townes for determining the *Megarhyssa* and *Tremex*, and for criticizing the manuscript.